
4.0 CLEANUP STANDARDS

The two primary components of cleanup standards are (1) cleanup levels and (2) points of compliance. Both must be established for each site. Cleanup levels determine at what concentration a particular hazardous substance does not threaten human health or the environment. The goal is to address all material above those concentrations with some remedy that prevents exposure to those materials. Points of compliance designate the locations on the site where the cleanup levels must be met.

4.1 CLEANUP LEVELS

Developing cleanup levels involves several steps: determining which method to use; determining the reasonable maximum exposure scenario; developing cleanup levels for individual substances in individual media, taking into account potential cross-media contamination; determining what substances contribute to overall risks at the site (indicator hazardous substances); evaluating concentrations of single hazardous substances in single media (i.e. soil or water) to select indicators; and, adjusting individual concentration levels downward to meet site total cancer risk and hazard index limits specified in MTCA.

There are three methods used to determine cleanup levels under MTCA: Methods A, B, and C. Method A is used for routine sites or sites that involve relatively few hazardous substances which have available numerical levels. Method B is the standard method for determining cleanup levels and is applicable to all sites. Method C is a conditional method used when a cleanup level under Method A or B is technically impossible to achieve or may cause greater environmental harm. Method C may also be applied to qualifying industrial properties. Cleanup level methods are established for ground water, surface water, soil, and air.

WAC 173-340-708 states that "when defining cleanup requirements at a site that is contaminated with a large number of hazardous substances, the department may eliminate from consideration those hazardous substances that contribute a small percentage of the overall threat to human and the environment. The remaining hazardous substances shall serve as indicator hazardous substances for purposes of defining site cleanup requirements."

The factors to be considered in determining whether or not a substance should be retained for an analysis of overall site risk or hazard are:

1. The frequency of detection of the substance. It may be appropriate to eliminate compounds, which are detected with a frequency of 5 % or less.
2. The concentration of the substance. Substances with concentrations marginally above their cleanup standards may not be important in considerations of overall hazard and risk.
3. The toxicity of the substance. It may be suitable to delete substances of low toxicity.

4. Environmental fate. Substances, which readily degrade in the environment, may not be of importance to overall hazard or risk. Conversely, those with highly toxic degradation products should be included in an analysis of overall hazard and risk.
5. The natural background levels of the substance. MTCA regulates risks due to substances found at contaminated waste sites. The risks caused by substances at background concentrations are not addressed by MTCA.
6. The mobility and potential for exposure to the substance. Substances may be eliminated if the values for these factors are low.

Limitations of analytical chemistry are also considered. The practical quantitation limit (PQL) for detection of a substance may be greater than its risk-based cleanup level. The risk-based cleanup level is used in the analysis of the over-all site hazard and risk in such cases, but the regulatory limit for that substance will be the PQL. Improvements in analytical technology will result in readjustment of the regulatory limit to match the new, lower PQL during any subsequent evaluation of the Site.

Once a list of substances to be assessed for cumulative risks and hazards has been developed, total site risk is calculated based upon the established cleanup levels. The total cancer risk for a site must not exceed 1×10^{-5} and the hazard index, calculated for chemicals with similar non-carcinogenic toxicity endpoints, must not exceed 1.

4.2 SITE CLEANUP LEVELS CRITERIA

4.2.1 Ground Water

Ecology has determined that the highest beneficial use of ground water at this Site is drinking water. Exposure to hazardous substances via ingestion of drinking water and other domestic uses represents the reasonable maximum exposure, and standards developed to protect these uses will be protective of all other uses. Method B is the appropriate method for developing cleanup levels for ground water. The Site is also located along the shores of the Spokane River. During periods of peak runoff in the late spring to early summer, the ground water gradient has been observed to be toward the Spokane River. Therefore, ground water must not violate surface water cleanup levels at the point of compliance. The Spokane River is classified as a Class A fresh surface water of the state under Chapter 173-201A WAC, Water Quality Standards for Surface Waters of the State of Washington. Characteristic uses for Class A water bodies include: domestic, industrial, agricultural water supply; stock watering; fish and shellfish; wildlife habitat; recreation, and commerce and navigation.

The Method B ground water cleanup levels are developed from:

1. Drinking water criteria that include:

- Applicable or Relevant and Appropriate Requirements (ARARs) including Maximum Contaminant Levels (MCLs) and Secondary Maximum Contaminant Levels (SMCLs). An ARAR value can be used as a cleanup level if it is sufficiently protective of human health and environment (i.e., the cancer risk is less than 1×10^{-5} or if the hazard quotient is less than 1).
- Formula values based on human health under WAC 173-340-720(3)(ii) for those substances for which sufficiently protective, health-based criteria have not been established under ARARs.

2. Levels to protect surface water that include (based on WAC 173-340-730):

- All water quality criteria published under Chapter 173-201A WAC, Water Quality Standards for Surface Water of the State of Washington;
- The EPA Ambient Water Criteria (AWQC) which are based on the protection of aquatic organisms (acute and chronic criteria) and human health published pursuant to section 304 of the Clean Water Act. These human health criteria are promulgated in the National Toxics Rule (NTR);
- Formula values under WAC 173-340-730(3)(iii) for hazardous substances which sufficiently protective, health-based criteria or standards have not been established under ARARs;
- For surface waters which represent a source or potential future source of drinking water, concentrations which are anticipated to result in no adverse impacts to human health as established in accordance with WAC 173-340-720(3), the Method B drinking water levels. These are the same criteria listed under #1.

3. Method A cleanup levels may be used for substances that do not have Method B levels. Method A levels are not included in the overall site risk calculations.

4. Levels based on natural or area background of the hazardous substances are also considered. Background levels are not included in the overall site risk calculations.

The Practical Quantitation Limits (PQL) for a substance may be greater than the health-based number. In such cases, the cleanup level becomes the PQL. If the PQL is lowered during cleanup of the site or during periodic review, the regulatory limit will be adjusted downward. However, total site risk will be calculated using actual health based levels.

Table 1 shows the applicable cleanup levels criteria for chemicals detected in site ground water. The most stringent of these criteria or the background concentration whichever is higher is the selected preliminary Method B cleanup level for each individual substance. PQLs are not considered until after the risk calculations. Soil cleanup levels that will be developed hereafter shall be protective of these ground water Method B cleanup levels.

4.2.2 Soils

The Site is currently zoned light industrial. However, because of surrounding urban revitalization in the area and preliminary plans for development expressed by SRP, Method B cleanup levels are proposed. Method B soil cleanup levels for soils are developed from:

- Concentrations established under applicable state and federal laws;
- Formula values based on human health under WAC 173-340-740(3)(iii) for which health-based criteria or standards have not been established under applicable state and federal laws.
- Concentrations which will not cause contamination of ground water at levels which exceed Method B ground water cleanup levels. For individual substances, concentrations that are equal or less than 100 times the ground water cleanup level is protective of ground water at the site unless demonstrated otherwise;

Table 2 shows the cleanup levels criteria for site soils. The soil concentration that is considered to be protective of ground water is 100 times the Method B ground water cleanup level developed in Table 1. The most stringent of these criteria or the background concentration whichever is higher is the preliminary Method B cleanup level for soil.

4.2.3 Surface Water

The Spokane River is a Class A Surface Water of the State. Method B Cleanup levels for surface water shall be at least as stringent as all of the following:

- Concentrations established under applicable state and federal laws including: All water quality criteria published in the water quality standards for surface waters of the state of Washington, Chapter 173-201A WAC; and, Water quality criteria based on protection of aquatic organisms (acute and chronic criteria) and human health published pursuant to section 304 of the Clean Water Act.
- Concentrations which are estimated to result in no adverse effects on the protection and propagation of wildlife, fish, and other aquatic life;

- For hazardous substances for which sufficiently protective, health-based criteria, or standards have not been established under applicable state and federal laws, formula values based on protection of human health under WAC 173-340-730(3)(iii) or for surface waters which represent a source of potential future source of drinking water, concentrations established under WAC 173-340-72(3).

Since the Spokane River is a Class A Surface Water of the state, the cleanup levels criteria are the same as those presented in Table 1.

4.2.4 Sediments

Ecology is in the process of establishing cleanup levels for freshwater sediments. There are currently no sediments cleanup levels under MTCA. Ecology has however identified freshwater sediment quality values (FSQV) for a number of constituents as shown in Table 5. These values represent a currently available criteria for development of preliminary cleanup levels for sediments.

4.3 SITE INDICATORS

4.3.1 Soil

Table 3 shows the screening for soil indicators. TPH, PAHs, carbazole, and inorganic compounds typically associated with coal tars (arsenic, barium, cadmium, lead, mercury, and selenium) are identified as the indicator substances. Benzene and styrene are not considered indicators, the frequency of detection being near 5% with only 6 % exceeding cleanup levels.

4.3.2 Ground Water

The data considered for ground water analysis were all collected from wells outside of the area of contamination. The frequency of detection and maximum concentrations based on the results are shown in Table 4. These show that ground water outside of the contaminated area has concentrations all below the cleanup levels.

Ground water samples collected from borings that went through contaminated soils were considered to be not representative of the ground water. Since all soil indicator substances concentrations exceed those that are protective of ground water, as indicated in Table 3, ground water inside the soil impacted area is assumed to be contaminated. All soil indicators are considered to be ground water indicators.

4.3.3 Surface Water/Sediments

Table 5 shows the maximum concentration measured in surface water and sediments. The maximum concentration of beryllium exceeds the Method B cleanup level for surface water. Since beryllium is not a ground water indicator for the Site, it is not considered a surface water

indicator. The maximum concentration of lead also exceeds the Method B cleanup level for surface water. This concentration is typical of lead concentrations measured in the River which have been shown to vary seasonally and exceed standards during certain times of the year. Lead is not considered an indicator for surface water.

There are no indicators for surface water and sediment.

4.4 SITE CLEANUP LEVELS AND CANCER RISK/HAZARD QUOTIENT

Cleanup levels are to be set for soils and ground water. Table 6 shows the cleanup levels with the cancer risk and hazard quotients calculations for the Site. As shown, the resulting total Site cancer risk is less than 1×10^{-5} and the Hazard Index for each end effect is less than or close to 1. The proposed cleanup levels meet the MTCA cancer risk and hazard index criteria; no downward adjustment of the levels would be necessary.

These cleanup levels in Table 6 levels are compared with the PQLs in Table 7. If the PQL is higher, the PQL becomes the cleanup level. For both the soils and ground water, the cleanup levels for all of the cPAHs are all below the PQL. Thus, for ground water, the Method A cleanup level for total cPAHs will be used since this is based on Method B concentrations but modified based on analytical considerations. For soils, because of the low solubility of cPAHs, the Method A cleanup level for cPAHs in soil is also adequately protective and will be used.

Table 7 shows the final Site cleanup levels.

4.5 POINTS OF COMPLIANCE

The Point of Compliance is defined in MTCA as the point or points where cleanup levels established in accordance with WAC 173-340-720 through WAC 173-340-760 shall be attained (WAC 173-340-200). Once those cleanup levels have been attained at that point, the site is no longer considered a threat to human health and the environment.

4.5.1 Soil

For soil cleanup levels based on protection of ground water, the point of compliance shall be established in the soils throughout the Site under WAC 173-340-740(6).

For soil cleanup levels based on human exposure via direct contact, the point of compliance shall be established in the soils throughout the Site from the ground surface to fifteen feet below the ground surface. This represents a reasonable estimate of the depth of the soil that could be excavated and distributed at the soil surface as a result of site development activities.

4.5.2 Ground Water

For ground water, WAC 173-340-720(6) governs the definition of the point of compliance. The point of compliance in ground water is established throughout the Site from the uppermost level of the saturated zone extending vertically to the lowest most depth, which could potentially be affected by the Site.

If hazardous substances remain contained on site, the department may approve a conditional point of compliance as close as practicable to the source of hazardous substances, not to exceed the property boundary.

At sites where the affected ground water flows into nearby surface water, the cleanup level may be based on protection of surface water. At these sites, the department may approve a conditional point of compliance that is located within the surface water as close as technically possible to the points or points where ground water flows into the surface water. Conditional points of compliance may be approved only under the conditions specified in WAC 173-340-720(6)(d).